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Optimization of two-dimensional wedge flow field at supersonic mach number (Article)

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Abstract

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In the present condition, there is a high demand for exact solutions through analytical, computational and measurements in the field of aerospace engineering. For wind tunnel testing it is difficult to bear the cost because of highly expensive materials needed for wind tunnel testing and the time needed to accomplish the experiments. Therefore, in this paper, analytical and numerical methods are used to evaluate the flow field over a wedge at supersonic Mach numbers for attached as well as detached shock cases. The wedge with the various half-wedge angle at Mach number 2 has been considered for the simulation. Closed form solutions are obtained for the various semi-vertex angle of the wedge. Supersonic similarity parameter has been used to obtain the pressure distribution over wedge at a different angle of attack with attached and detached shock wave cases. Results are in good agreement with the theoretical results of the shock-expansion theory. The analytical results are compared with those obtained by simulation. The results are obtained for pressure, temperature, Mach number, and the density using ANSYS code are in good agreement with the results obtained analytically.

SciVal Topic Prominence

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